

Utilization of Monolithich Solid phases for sample preparation and processing, Phase I

Completed Technology Project (2018 - 2019)



Project Introduction

This proposal addresses the issue of sample preparation technologies which can be utilized in ocean world missions to enhance the sensitivity and selectivity in the analyses of collected samples. On Earth, solid phase matrices are utilized extensively for capture, separation, and selective retention of components in the sample analysis process. Utilization of solid phases for similar processes is not yet possible on other world based missions due to a lack of investigations into the compatibility of these materials with space flight and deployment under other world conditions. This Phase I effort seeks to investigate commercially available solid phase substrates for three sample processing methods that would be directly integrated into existing NASA programs; these methods are solid phase extraction (SPE), desalting, and ion exchange. This effort will evaluate the performance of different substrates and surface coatings through stresses expected to be experienced on space deployment. The goal is to determine which substrates/surfaces might be able to play a role in future sample analysis missions that are planned for exploration of ocean worlds.

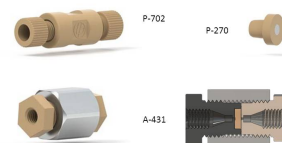
Anticipated Benefits

Solid phase methods have a number of important roles to play in NASA missions. Solid phase extractions can enhance the sensitivity of compounds found only in very dilute quantities. Desalting methods remove the salt that can interfere with the ionization processes used for mass spectroscopy.

Qualification of ion exchange media provides desalting and charged mineral removal from samples. The Phase II effort to qualify chromatographic solid phases will bring great benefits to NASA's efforts.

These solid phase methods are already utilized extensively for earth based sample preparation before analysis. The materials to be qualified are already commercially available, thus no new non-NASA applications are anticipated.

Two commercially available systems from IDEX that can be modified to hold a solid phase matrix. Both have fitting on both sides for bringing fluids into and out of the solid phase bed and can be fitted with the necessary frits to hold the solid phase matrix in place. These components will be integrated into a bread board system for testing solid phase matrices.



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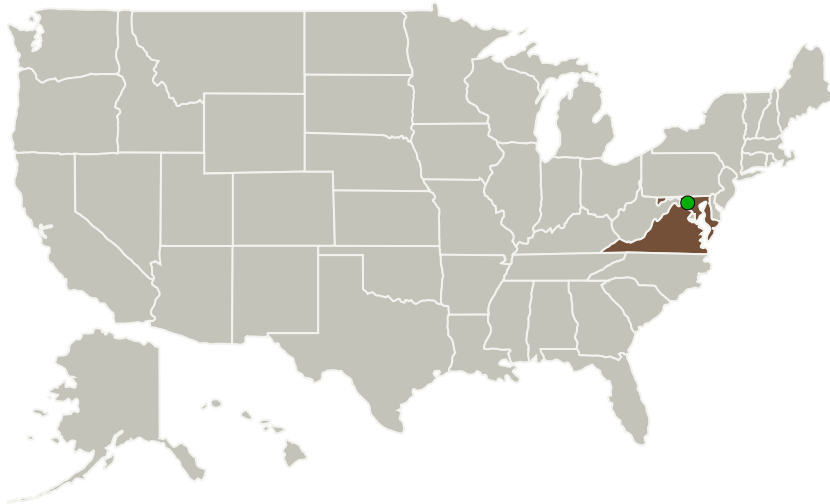
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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
J2F Engineering	Lead Organization	Industry	Charlottesville, Virginia
● Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations

Maryland	Virginia
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Project Transitions

**July 2018:** Project Start**February 2019:** Closed out**Closeout Documentation:**

- Final Summary Chart(<https://techport.nasa.gov/file/140138>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

J2F Engineering

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

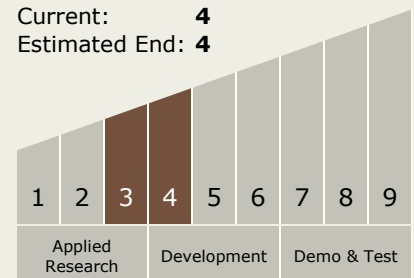
Carlos Torrez

Principal Investigator:

Jerome P Ferrance

Technology Maturity (TRL)

Start: **3**
 Current: **4**
 Estimated End: **4**



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Images



Briefing Chart Image

Utilization of Monolithic Solid phases for sample preparation and processing, Phase I
(<https://techport.nasa.gov/image/134389>)



Final Summary Chart Image

Utilization of Monolithic Solid phases for sample preparation and processing, Phase I
(<https://techport.nasa.gov/image/129230>)

Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.1 Remote Sensing Instruments/Sensors
 - └ TX08.1.5 Lasers

Target Destination

Others Inside the Solar System